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## **Worksite tobacco prevention in the Canton of Zurich: stages of change, predictors, and outcomes**

Friedrich, V ; Brügger, A ; Bauer, G

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# Worksite tobacco prevention in the Canton of Zurich: stages of change, predictors, and outcomes

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## Abstract

**Objectives** This study provides information about the prevalence of tobacco prevention (TP) and the stages of change with respect to the introduction of TP among companies in the Canton of Zurich ( $n = 1,648$ ). It explores the factors that predict restrictiveness of smoking policies, number of individual support measures, interest in services to promote TP, and the relationship between TP and health outcomes.

**Methods** Data were gathered by means of a written questionnaire and analysed using ordinal regression models.

**Results** Whereas many companies maintain smoke-free policies, only few provide cessation-courses. Health and welfare organisations have strictest, and building and hospitality companies have least strict policies. Company size predicts number of individual support measures but not policy restrictiveness. Both measures are predicted by personal concern of the representative. Interest in services is predicted by tobacco-related problems and medium stages of change. Finally, stricter policies are associated with lower proportion of smokers and less tobacco-related problems.

**Conclusions** Health professionals should support less advanced companies in their endeavour to implement TP. The findings provide a baseline to evaluate the implementation of the forthcoming smoke-free legislation.

**Keywords** Tobacco prevention · Smoke-free policies · Passive smoking · Workplace health promotion

## Introduction

Exposure to environmental tobacco smoke (ETS) is a cause of serious diseases (U.S. Department of Health and Human Services 2006). In Switzerland, 24% of the female and 33% of the male population are smokers (Keller et al. 2009), and exposure to ETS is widespread (Radtko et al. 2007). As in many countries, there are efforts in Switzerland to provide legal protection from ETS with a special focus on smoke-free worksites. In this regard, however, Switzerland is undergoing a transition phase: While some cantons (member states of Switzerland) ban smoking in public places and hospitality venues, a federal law concerning workplace tobacco control is still pending. Until now, most employers have had considerable leeway with regard to worksite tobacco prevention (TP), leading to the situation that passive smoking is widespread at Swiss worksites (Keller et al. 2009).

In light of the many benefits of workplace smoking policies that have been reported with regard to ETS exposure (Hammond et al. 1995; Marcus et al. 1992; Repace et al. 2006), improved health (Barone-Adesi et al. 2006; Menzies et al. 2006), smoking prevalence and tobacco consumption (Brownson et al. 2002; Fichtenberg and Glantz 2002; Levy et al. 2004; Sorensen et al. 1991), and absenteeism (Bush and Wooden 1995; Halpern et al. 2001), the question arises as to what extent employers in Switzerland are taking steps towards TP, and which types of worksites require special preventive efforts.

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## Previous findings

In 2001, 70% of Swiss companies had some kind of official smoking regulation (Buchmann and Müller 2001). Of these companies, 47% had regulations before 2000, and only 22% had regulations prior to 1990. Also, data from other countries show that over the last decade, worksite TP (i.e. adopting smoking policies or increasing their restrictiveness, and offering individual support measures such as information about the harmful effects of smoking, self-help material or cessation courses) became more prevalent, even before legal regulations were introduced (Fielding 1990; Frankish et al. 1997; Glasgow et al. 1992; Herbst et al. 1996). However, smoking policies and other TP measures are not equally prevalent across different kinds of workplaces. For example, it has been shown that *larger* organisations are more likely to offer individual support measures (Ashley et al. 1997; Buchmann and Müller 2001; Fielding 1990; Frankish et al. 1997; Sorensen et al. 1997) and to have stricter policies (Ashley et al. 1997; Hu et al. 2005; U.S. Department of Health and Human Services 1993). Findings concerning *industry type* are partially inconsistent: Whereas Sorensen et al. (Sorensen et al. 1997) and Fielding (Fielding 1990) found that manufacturing businesses were least likely to have smoking policies and offer individual support, Hu et al. (2005) and Heloma and Jaakkola (2003) found that these were among those with strictest policies. Studies by Emmons et al. (2000) and Gerlach et al. (1997) indicate that the proportion of white-collar workers is positively related to restrictive policies, whereas individual support measures are more prevalent among worksites with a blue-collar workforce. Gerlach et al. (1997) report that worksites related to healthcare are most likely, and worksites related to food services are least likely to be smoke-free. Concerning gender distribution of the workforce, which is associated with industry type, it has consistently been shown that the *percentage of women* is positively associated with restrictive policies (Fielding 1990; Gerlach et al. 1997; Hu et al. 2005), and individual support measures seem to be more prevalent in worksites with a predominantly male workforce (Sorensen et al. 1997). The reason for this might be that smoking is more prevalent among men, and therefore the need for cessation programs in worksites primarily employing men is especially salient. Since it has been shown that educational status is associated with smoking (Huisman et al. 2005), the *percentage of unskilled workers* must also be taken into account in this context.

Other attributes of the organisation that have been investigated in relation to worksite TP are workforce stability and centralisation of decision-making: Emmons et al. (2000) showed that companies with higher *workforce stability* were more likely to offer smoking cessation courses

(however, cf. Sorensen et al. 1997). Studies examining *(de)centralisation* of decision-making showed that smoking policies (Emmons and Biener 1993) and cessation courses (Cooke 2000) were more likely in organisations where several people were involved in decision-making, confirming the notion that the adoption of TP as an ‘innovation’ is constrained when few people dominate the system (Emmons et al. 2000; Rogers 2003). Findings also suggest that *previous practice* (i.e. the history of offering occupational health interventions) and the *attributes of the representative* play a key role: Frankish et al. (1997) and Sorensen et al. (1997) showed that organisations that had offered other health-promotion activities had a higher prevalence of smoking policies and offered more individual support measures. According to Emmons and Biener (1993) and Emmons et al. (2000), companies whose CEOs were concerned about employees’ health and well-being were more likely to have a smoking policy and individual support measures. Similarly, Linnan et al. (2002) found that managers who believed that environmental tobacco smoke is harmful and who were non-smokers were more likely to implement restrictive policies.

## Study goal

The aim of this study is to analyse the prevalence of TP measures among worksites in the Canton of Zurich, where—at time of data collection—no forceful legal regulation was in place. We will not only map the actual state but also provide information about the adoption process, using the Transtheoretical model of change (Prochaska 2000) to investigate whether companies are planning to introduce TP. We examine which factors predict the adoption of TP measures, and whether worksite TP is associated with relevant outcomes such as percentage of smokers in the workforce, ETS-related problems, and absenteeism. To provide a basis to further disseminate worksite TP, we additionally analyse which factors predict the companies’ interest in receiving services from workplace health promotion (WHP) consultants in order to implement or advance worksite TP.

## Conceptual model and hypotheses

In this study, worksite TP is conceptualised as restrictiveness of smoking policies (spatial restrictions) and number of individual support measures for smokers (e.g. cessation courses). To predict which factors facilitate or hinder the adoption of worksite TP and whether worksite TP leads to the desired effects, we build on the above findings. Additionally, we refer to the Transtheoretical model of change that originally was developed to explain individual behaviour change, but also has been used to describe

change on an organisational level (Prochaska 2000). The model proposes five stages of change: pre-contemplation (no intention to change), contemplation (intention to change), preparation (intention to change in near future; planning concrete steps), action (taking concrete steps to change), and maintenance (keeping up the change). In this study, stages will be analysed with regard to the adoption of smoke-free policies and cessation courses. As the Transtheoretical model describes decisional balance as an important predictor for advancement across stages, we take into account perceived advantages (pros) and disadvantages (cons) of the change in question. The hypothesised relationships are illustrated in Fig. 1 and written out below.

We hypothesise that larger companies have *stricter policies* and more *individual support measures*; that the percentage of women in the workforce is positively associated with policy restrictiveness, and that the percentage of men and unskilled workers, as well as workforce stability are positively associated with the number of support measures; that centralisation of decision-making is negatively associated with TP measures; and that the existence of other WHP measures and the institutionalisation of WHP, as well as personal concern of the representative and his or her non-smoking status are positively associated with TP measures.

We examine the companies' *stages of change* regarding the adoption of a smoke-free policy and cessation courses,

and hypothesise that management's perception of advantages (pros) of TP will rise with stage of change, whereas the perception of disadvantages (cons) will decline (Prochaska 2000). Further, we explore which of the above-mentioned variables best predict stage.

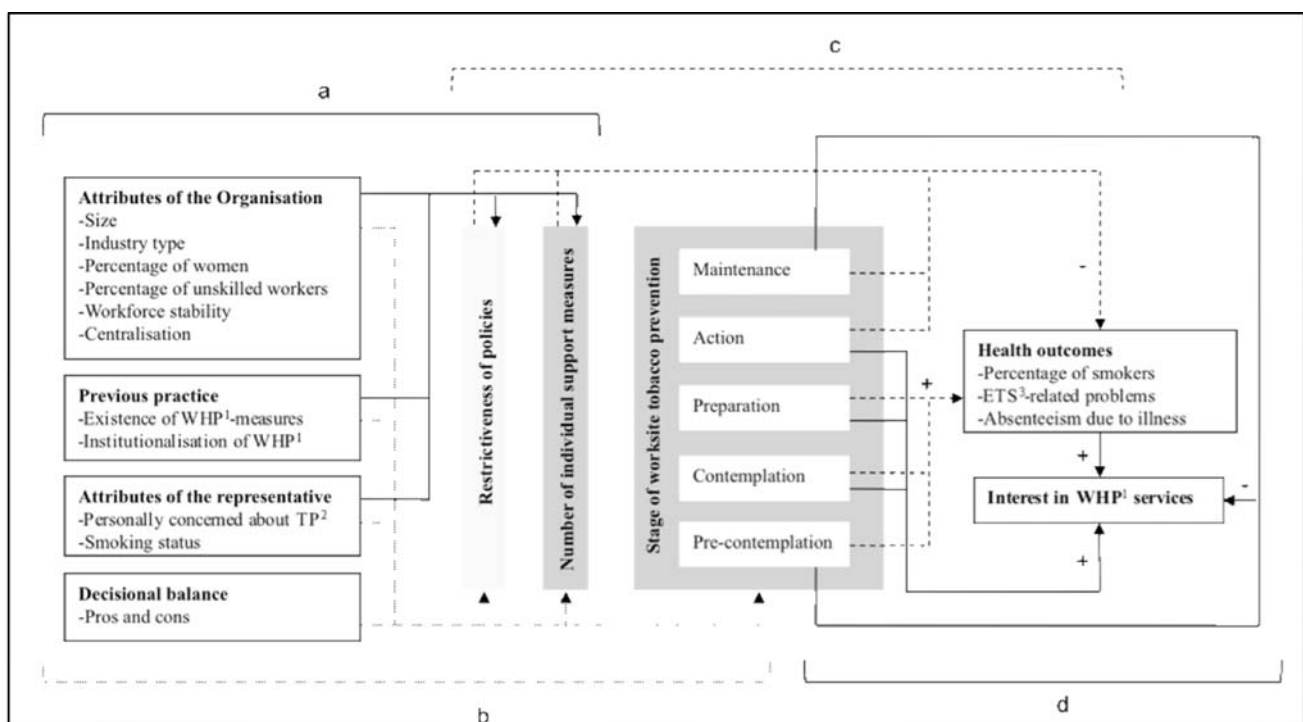
We hypothesise that restrictiveness of policies, number of individual support measures and a higher stage of change are negatively associated with the following *health outcomes*: percentage of smokers in the workforce, ETS-related problems (ETS exposure and complaints about ETS exposure), and absenteeism.

Last, we assume that percentage of smokers, ETS-related problems, and absenteeism are positively associated with *interest in services*; that interest is low when companies have already systematically implemented TP measures or when companies do not plan to adopt TP, and that interest is higher in medium stages.

## Method

### Instrument and variables

Data were gathered by means of a questionnaire assessing the following variables: (1) Attributes of the organisation. The percentage of female employees and unskilled workers was assessed by one item each with given answer options



Notes <sup>1</sup>Workplace health promotion; <sup>2</sup>Tobacco prevention; <sup>3</sup>Environmental tobacco smoke.

**Fig. 1** Conceptual model for the prediction of *a* TP measures, *b* stages of change, *c* health outcomes, and *d* interest in WHP services

in percent. Workforce stability was assessed by a single item measure ("Most of our employees work in our company for many years", 1 = not true, 5 = true). To capture centralisation, we asked who decides on the introduction of WHP measures (1 = organisational units decide for themselves, 2 = human resource management decides, 3 = CEO decides, Emmons et al. 2000). Information about size (number of employees) and industry type was obtained from the Federal Statistical Office (FSO). (2) Previous practice. Four items focused on the degree to which various health-related measures (e.g. courses for general health behaviours) were already implemented (Bauer and Jenny 2007). Answers were given on a five-point scale (1 = not interested yet, 3 = intention to implement in the next months, 5 = systematically implemented). Institutionalisation of WHP was measured via three statements (funds allocated to health promotion, WHP as task of a person or organisational unit, systematic analysis of health figures, Bauer et al. 2002). (3) Attributes of the representative. We asked whether the representatives were personally concerned about TP (e.g. "Smoking is a private matter and none of the company's business"), and whether she or he was a smoker or non-smoker. We also asked about the representative's position (CEO, human resource manager, occupational health and safety manager) and authority to implement WHP measures. (4) Decisional balance. These items dealt with pros and cons (health and economic benefits, rejection by employees and investments) of smoke-free workplaces and smoking cessation courses from the management's perspective (Bauer and Jenny 2007; McMahon et al. 2002). (5) TP measures. Prevalence and restrictiveness of policies were measured with a forced choice item: "Smoking is not allowed anywhere" (4), "Smoking is allowed outside, but not in buildings" (3), "Smoking is allowed outside and in certain indoor areas" (2), "Smoking is allowed anywhere except a few non-smoking areas" (1), "There is no policy" (0) (Biener et al. 1999). To assess the prevalence and number (0–3) of individual support measures we asked whether companies offered smoking cessation courses for their personnel, individual consultancy for smokers or information material (Buchmann and Müller 2001; Glasgow et al. 1996). (6) Stages of change. The organisation's stage of change was assessed with one item each for smoke-free policy and cessation courses. Answers were given on a five-point scale with the following answer options: "We are not interested in adopting a smoke-free policy/cessation courses" (1, pre-contemplation); "We have not yet implemented a smoke-free policy/cessation courses but are interested in doing so" (2, contemplation); "We intend to implement a smoke-free policy/cessation courses in the next few months" (3, preparation); "Until now we have implemented a smoke-free policy/cessation courses only erratically" (4, action);

"We have systematically implemented a smoke-free policy/cessation courses" (5, maintenance). (7) Health outcomes. The percentage of smokers was assessed by one item with given answer options in percent. ETS-related problems referred to ETS exposure of employees and complaints about ETS (Biener et al. 1999). Absenteeism was assessed with a single item ("In our company we have a high level of absenteeism due to illness"). (8) Interest in WHP services. Interest in WHP services was measured by a binary item capturing the companies' interest in using a free health promotion consultancy service, focussed on TP.

The items concerning institutionalisation of WHP, ETS-related problems, absenteeism, decisional balance, and personal concern used a 5-point Likert scale (1 = disagree, 5 = agree). Apart from the questions relating to previous practice and personal concern, all items included the response option "I don't know" in case an answer was not possible.

### Sample and procedure

In May 2007, all companies in the Canton of Zurich, Switzerland, with 20 or more employees ( $N = 4,706$ ) were sent a hardcopy of the questionnaire, addressed to human resource managers or occupational health managers. Addresses and information about number of employees were obtained from the FSO. Four weeks later, a reminder was sent to all companies that had not returned the questionnaire. In total, 1,648 questionnaires were completed and returned. 200 questionnaires were returned empty because the company had fewer than 20 employees, moved away or ceased to exist. After subtracting these from the overall sample, the response rate was 36.56%. Of the 1,648 completed questionnaires, 1,627 were suitable for statistical analyses.

### Statistical analyses

In order to assess the sample's representativity, we compared its composition in terms of company size and industry branch to the data of the FSO, which included all the worksites in the Canton of Zurich. Descriptive statistics were used to examine the prevalence of TP and the distribution of stages. Ordinal regression analyses were performed to test whether attributes of the organisation, previous practice, attributes of the representative and decisional balance predict restrictiveness of policies and number of individual support measures, and to explore whether any of those variables predict stage of change. Ordinal regression analyses were also performed to test whether stricter policies, more individual support measures and a higher stage lead to the hypothesised health benefits. Finally, to examine whether health-related problems and



stage of change predict interest in WHP services, logistic regression analyses were performed. For all regression analyses, we first analysed bivariate relationships by testing each predictor variable's predictive power for the respective outcome variable. In a second step, those variables that were significant and unambiguously interpretable in bivariate analyses were entered simultaneously as independent variables into conditional regression analyses. For all analyses we used SPSS 11.

## Results

### Characteristics of respondent organisations and representatives

As Table 1 shows, the majority (63%) of the respondent organisations are small (20–49 employees). The four major branches are trading, maintenance and repair businesses (16%), healthcare and welfare (15%), manufacturing industry (15%), and real estate, renting and corporate services (13%). Compared to data from the Federal Statistical Office, the sample is representative of worksites in the Canton of Zurich concerning company size and the four major branches, except that healthcare and welfare organisations are slightly overrepresented (+5%). With regard to gender, the proportional distribution is balanced, with a slight underrepresentation of women in the workforce. Most companies in the sample have few unskilled workers and less than 40% smokers in the workforce. As to the representatives, the majority (74%) are non-smokers. Half of the representatives (49.7%) serve as CEO of their organisations and/or as human resource manager (45.3%). Some (12.7%) indicate that they are (in addition to their function as CEO/human resource manager or exclusively) responsible for health and safety in their organisation. Irrespective of the formal position, 52.4% are authorised to decide on occupational health measures.

### Prevalence of TP measures and distribution of stages of change

The majority (93.5%) of the worksites have some kind of smoking policy. Among these, 2.5% have a very strict ban (covering areas outside buildings), 40.1% have an indoor ban, 50.6% allow smoking outside and in some designated indoor areas, and 4% allow smoking everywhere apart from some smoke-free areas (Table 1). At least one individual support measure is offered by 15.3% of the organisations (1 measure: 11.8%; 2 measures: 2.8%; 3 measures: 0.7%). Cessation courses exist in 7.6%, information material in 7.3% and individual consultancy in 4.5% of the organisations. Health and welfare organisations

have the strictest, and building companies have the least strict policies. Public administrations offer most, real estate firms offer fewest individual support measures. While many companies (47.4%) are in the maintenance-stage regarding smoke-free policies, only 3.5% are in the maintenance-stage regarding cessation-courses.

### Predictors of worksite TP and stages of change

As the correlation matrix (Table 2) shows, some variables are significantly correlated with several other variables. The confounding effect resulting from these intercorrelations is analysed with conditional regression analyses described below.

Table 3 shows the odds ratios for the ordinal regressions of policy restrictiveness, individual support measures, and stage of change for smoke-free policy and cessation courses. For each outcome, the table presents bivariate relationships with each of the predictor variables (left column) and conditional relationships (significant predictors entered simultaneously, right column). To compare sectors, building, health and welfare, and hospitality branches were selected and contrasted with all other branches.

Bivariate ordinal regressions of *policy restrictiveness* against each of the predictor variables show that companies in the healthcare and welfare sector are more, and companies in building and hospitality industry are less likely to have restrictive smoking policies, compared to all other branches. A high proportion of women, and a low proportion of unskilled workers are associated with more restrictive policies. Also, the existence of other WHP measures, the institutionalisation of WHP and perceived advantages of policies (combined measure of decisional balance with recoded con-items) are positively associated with policy restrictiveness. Similarly, the representative's concern and his or her non-smoking status are predictors for policy restrictiveness. When all variables that predict restrictiveness in bivariate analyses were entered simultaneously, four variables continued to predict policy restrictiveness: industry type, percentage of women, personal concern and perceived advantages.

Bivariate ordinal regressions of *number of individual support measures* against each of the predictor variables show that larger worksites as well as healthcare and welfare organisations are more likely to provide individual support measures, whereas hospitality venues provide less. There is a tendency for companies with fewer women to provide fewer support measures. Existence of other WHP-measures and institutionalisation of WHP are positively associated with individual support measures. Finally, the representative's concern and perceived advantages of cessation courses predict the number of support measures.

**Table 1** Attributes of the organizations and representatives, prevalence of TP measures, and interest in WHP services

Attributes of the organization	N	%		N	%
Size			Policy restrictiveness		
20–49 employees	1,035	63.0	Smoking is ...		
50–250 employees	528	32.2	not allowed anywhere	40	2.5
>250 employees	79	4.8	allowed outside, but not in buildings	649	40.1
Industry type			allowed outside and in certain indoor areas	772	47.7
Building	140	8.5	allowed anywhere except in a few non-smoking areas	65	4.0
Hospitality	131	8.0	There is no policy	93	5.7
Health care and welfare	247	15.0			
Other	1,127	68.5	Individual support measures		
Agriculture and forestry	24	1.5	Smoking cessation courses	126	7.6
Manufacturing	243	14.8	Information material	121	7.3
Energy and water supply	13	0.8	Individual consultancy	74	4.5
Trading, maintenance and repair	264	16.0			
Transportation and telecommunication	102	6.2	Interest in WHP services	239	14.5
Financial institutions and assurances	74	4.5			
Real estate, renting, corporate services	215	13.0	Attributes of the representative		
Public admin., defence, social insurance	110	6.7	Smoking status		
Other services	82	5.0	Non-smoker	1,198	74.0
% Women			Occasional smoker	209	12.9
<20%	472	29.6	Smoker	212	13.1
20–39%	292	18.3			
40–59%	414	25.9	Function		
60–79%	232	14.5	CEO	820	49.7
>80%	187	11.7	Human resource manager	747	45.3
% Unskilled employees			Health and safety manager	209	12.7
<20%	914	59.4			
20–39%	263	17.1	Decision-making authority		
40–59%	186	12.1	Not authorised	762	47.6
60–79%	111	7.2	Authorised	839	52.4
>80%	66	4.3			
% Smokers					
<20%	587	40.1			
20–39%	555	37.9			
40–59%	249	17.0			
60–79%	52	3.6			
>80%	21	1.4			

When the significant variables were simultaneously entered into the regression, the following remained significant: company size, existence of other WHP measures, institutionalisation of WHP, concern of the representative, and perceived advantages.

The variables that predict policy restrictiveness and those that predict number of individual support measures in bivariate analyses do also predict *stage of change* for smoke-free policies and cessation courses, respectively (Table 3). The same is true for conditional analyses, with the following exceptions: Percentage of women does not,

and other WHP measures do predict higher stage with regard to smoke-free policies; as to cessation course, health and welfare companies are less likely to be in a higher stage in conditional analyses.

#### Predictors of health outcomes

As Table 4 shows, policy restrictiveness and a higher stage of change with regard to smoke-free policies are negatively associated with percentage of smokers in the workforce and with ETS-related problems (ETS exposure and complaints

**Table 2** Spearman correlations among variables

	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Organisat. attributes																			
1. Company size	0.03	0.06**	-0.09***	-0.03	0.22***	0.24***	0.07**	-0.01	-0.01	0.05*	-0.06*	0.12***	0.02	0.14***	-0.02	0.03	0.19***	0.06*	-0.01
2. % Women		0.05*	-0.12***	0.02	0.16***	0.07**	0.07**	0.02	0.13***	0.07**	0.18***	0.06*	0.16***	0.06**	-0.09***	-0.12***	0.09***	-0.06*	-0.02
3. % Unskilled			0.02	0.01	-0.06*	0.06**	-0.05*	0.03	-0.15***	-0.03	-0.15***	-0.05*	-0.12***	0.03	0.28***	0.18***	0.17***	0.03	0.10**
4. Stability				-0.02	0.03	0.10***	0.04	-0.05*	0.00	0.04*	-0.07**	-0.01	-0.03	-0.01	-0.12***	-0.04*	-0.18***	0.03	-0.05
5. Centralisation					-0.03	-0.06*	0.02	-0.04*	0.01	-0.01	-0.03	-0.04	0.02	0.03	-0.01	0.05*	0.02	0.06	0.09**
Previous WHP practice																			
6. Other measures					0.73	0.55***	0.23***	-0.03	0.19***	0.19***	0.12***	0.27***	0.23***	0.32***	-0.15***	-0.13***	0.12***	0.08**	0.10**
7. Institutionalisation						0.72	0.20***	-0.06*	0.07**	0.17***	0.06*	0.27***	0.11***	0.30***	-0.06**	-0.08***	0.18***	0.07*	0.13***
Representative's attrib.																			
8. Personal concern							0.41	-0.28***	0.31***	0.30***	0.22***	0.21***	0.34***	0.27***	-0.15***	-0.07**	0.09***	0.14***	0.08**
9. Smoking status									-0.12***	-0.05*	-0.10***	-0.04*	-0.12***	-0.05*	0.18***	0.08**	0.00	-0.05	0.04
Decisional balance																			
10. Pros policy									0.41	0.33***	0.41***	0.06*	0.50***	0.06**	-0.24***	-0.33***	-0.01	-0.10**	-0.11**
11. Pros courses										0.64	0.11***	0.18***	0.19***	0.33***	-0.10***	-0.06*	0.04*	0.06	0.13***
Worksite TP																			
12. Restrictiveness												0.07**	0.53***	0.04	-0.25***	-0.47***	-0.02	-0.15***	-0.07*
13. Indiv. supp. meas.													0.11***	0.44***	-0.10***	-0.09***	0.07**	0.04	0.06*
14. Stage policy														0.15***	-0.22***	-0.37***	0.01	-0.10**	-0.05
15. Stage courses															-0.05*	-0.01	0.14***	0.15***	0.27***
Health/finan. outcomes																			
16. % Smokers																	0.29***	0.17***	0.08*
17. ETS-rel. problems																	0.67	0.10***	0.11**
18. Absenteeism																		0.02	0.06
Interest in services																			
19. Policy																			
20. Courses																			0.57***

For scales, the figures in italics in the diagonal cells indicate Cronbach's  $\alpha$ . \* stands for  $p < 0.05$ , \*\* for  $p < 0.01$ , \*\*\* for  $p < 0.001$



**Table 3** Bivariate and conditional odds ratios for predictors of policy restrictiveness, number of individual support measures and stage of change (ordinal regressions)

	Policy restrictiveness <sup>a</sup>		Number of individual support measures <sup>b</sup>		Stage (smoke-free policy) <sup>c</sup>		Stage (cessation course) <sup>c</sup>	
	Biv. <sup>d</sup> OR	Cond. <sup>e</sup> OR	Biv. OR	Cond. OR	Biv. OR	Cond. OR	Biv. OR	Cond. OR
<b>Organisational attributes</b>								
Company size								
20–49	1.33		0.23***	0.45**	0.74		0.26***	0.47**
50–250	1.08		0.34***	0.43**	0.75		0.40***	0.52*
>250	Ref.		Ref.	Ref.	Ref.		Ref.	Ref.
Branch								
Building	0.29***	0.46***	0.92	1.44	0.40***	0.61*	0.75	1.00
Hospitality	0.34***	0.56**	0.41*	0.59	0.39***	0.67	0.62*	0.82
Health and welfare	1.72***	1.33	1.51*	0.86	1.79***	1.42	1.13	0.45***
Other	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
% Women								
<20%	0.35***	0.41*	0.59*	0.85	0.44***	1.04	0.60**	0.65
20–39%	0.48***	0.65	0.98	1.23	0.60**	1.07	0.79	0.74
40–59 %	0.66*	0.98	0.62*	1.10	0.75	1.36	0.62*	0.71
60–79%	0.73	0.99	1.04	1.41	0.90	1.37	0.84	0.88
>80%	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
% Unskilled workers								
<20%	1.61*	1.17	1.32		2.04**	1.27	1.13	
20–39%	0.99	0.72	0.85		1.31	0.91	1.28	
40–59%	0.74	0.61	1.13		1.34	1.01	1.36	
60–79%	0.88	0.81	0.96		1.40	1.20	1.50	
>80%	Ref.	Ref.	Ref.		Ref.	Ref.	Ref.	
Workforce stability								
Low stability	0.61		0.48		0.58		0.61	
...	1.32		0.68		1.64		1.05	
Neutral	1.48**		1.13		1.16		1.00	
...	1.30*		1.19		1.01		1.16	
High stability	Ref.		Ref.		Ref.		Ref.	
Centralisation								
Another entity	0.58		1.58		0.56		0.89	
Delegated	1.23		1.33		0.94		0.79	
CEO	Ref.		Ref.		Ref.		Ref.	
Previous practice								
Other WHP-measures	1.25***	0.99	2.08***	1.40***	1.50***	1.19**	2.02***	1.51***
Institutionalisation of WHP	1.09*	1.02	1.96***	1.55***	1.19***	0.98	1.77***	1.36***
Representative's attributes								
Personal concern	1.46***	1.15**	1.75***	1.52***	1.82***	1.41***	1.75***	1.47***
Smoking status								
Non-smoker	1.86***	1.31	1.43		1.76***	1.13	1.55*	
Occasional smoker	1.55*	1.42	1.15		1.42	1.25	1.33	
Smoker	Ref.	Ref.	Ref.		Ref.	Ref.	Ref.	

**Table 3** continued

	Policy restrictiveness <sup>a</sup>		Number of individual support measures <sup>b</sup>		Stage (smoke-free policy) <sup>c</sup>		Stage (cessation course) <sup>c</sup>	
	Biv. <sup>d</sup> OR	Cond. <sup>e</sup> OR	Biv. OR	Cond. OR	Biv. OR	Cond. OR	Biv. OR	Cond. OR
Decisional balance								
Pros and cons <sup>f</sup>	3.25***	2.86***	1.79***	1.34**	4.48***	3.52***	2.37***	2.00***

<sup>a</sup> Ranges from 0 (no policy) to 4 (banned in- and outdoors)

<sup>b</sup> Ranges from 0 (no measure) to 3 (three measures)

<sup>c</sup> Ranges from 1 (pre-contemplation) to 5 (maintenance)

<sup>d</sup> Bivariate analyses

<sup>e</sup> Conditional analyses

<sup>f</sup> Pros and cons for the respective measure, cons recoded

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ ; ref. = reference category (odds ratio = 1)

**Table 4** Bivariate and conditional odds ratios for predictors of health outcomes (ordinal regressions)

	% Smokers <sup>a</sup>	ETS-related problems <sup>b</sup>		Absenteeism <sup>c</sup>	
	Bivariate <sup>d</sup> OR	Bivariate OR	Conditional OR	Bivariate OR	Conditional OR
Policy restrictiveness					
No policy	7.11***	7.56***	3.77**	0.90	
Designated non-smoking areas	21.3***	15.50***	8.08***	0.81	
Designated smoking areas	3.08**	4.98***	2.75**	1.06	
Banned indoors	1.78	0.65	0.58	0.89	
Banned in- and outdoors	Ref.	Ref.	Ref.	Ref.	
Individual support measures					
0 measure	1.69	3.59		0.54	
1 measure	1.06	2.07		0.71	
2 measures	0.86	2.93		0.85	
3 measures	Ref.	Ref.		Ref.	
Stage policy					
Pre-contemplation	2.66***	4.49***	1.89***	0.83	0.94
Contemplation	2.19***	8.23***	3.52***	1.27*	1.26
Preparation	1.65*	11.21***	6.16***	1.64*	1.54
Action	1.80**	4.50***	2.79***	0.93	0.96
Maintenance	Ref.	Ref.	Ref.	Ref.	Ref.
Stage course					
Pre-contemplation	1.71	2.49**	2.31*	0.57*	0.58*
Contemplation	1.63	3.07***	2.65**	0.91	0.87
Preparation	1.05	3.07*	1.53	0.92	0.82
Action	1.06	1.18	1.60	1.33	1.34
Maintenance	Ref.	Ref.	Ref.	Ref.	Ref.

<sup>a</sup> Ranges from 1 (<20%) to 5 (>80%)

<sup>b</sup> Two item mean (responses range from 1 to 5)

<sup>c</sup> Ranges from 1 (low absenteeism) to 5 (high absenteeism)

<sup>d</sup> Only bivariate analyses were performed, because policy restrictiveness and stage (policy) are not correlated

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ ; Ref. = reference category (odds ratio = 1)

about ETS). Also, in companies with a higher stage of change regarding cessation courses, ETS-related problems are lower. Companies that are in the contemplation and preparation stages regarding smoke-free policies report higher absenteeism compared to companies in the maintenance stage. Companies in the pre-contemplation stage regarding cessation courses report less absenteeism.

#### Prevalence and predictors of interest in WHP services

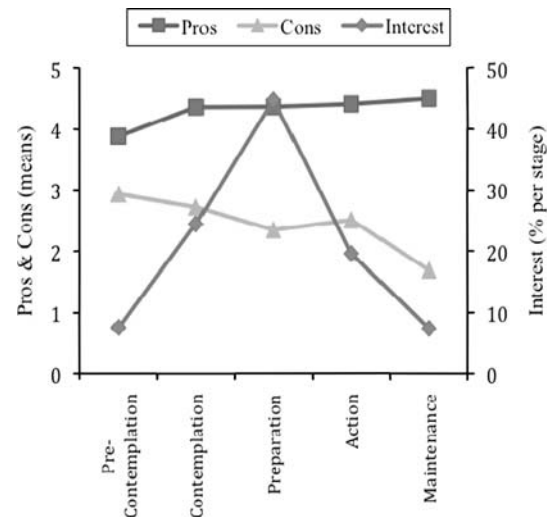
A total of 239 companies (14.5%) requested WHP services for the introduction of a smoke-free policy (115) and/or cessation courses (190). Bivariate and conditional logistic regressions of interest in WHP services show that tobacco-related problems and medium stages (pre-contemplation and contemplation) are predictors for interest in services

**Table 5** Bivariate and conditional odds ratios for predictors of interest in services (logistic regressions)

	Interest in services <sup>a</sup>	
	Bivariate OR	Conditional OR
% Smokers		
<20%	2.48	
20–39%	4.55	
40–59%	3.05	
60–79%	6.65	
>80%	Ref.	
ETS-related problems	1.325***	1.168*
Absenteeism		
Low absenteeism	1.17	
...	1.45	
Medium	1.72	
...	1.43	
High absenteeism	Ref.	
Stage policy		
Pre-contemplation	0.91	1.14
Contemplation	2.16***	1.44
Preparation	4.10***	3.37***
Action	1.73	1.46
Maintenance	Ref.	Ref.
Stage course		
Pre-contemplation	2.66	2.46
Contemplation	12.54***	11.10**
Preparation	9.29*	5.76*
Action	1.64	1.64
Maintenance	Ref.	Ref.

<sup>a</sup> For becoming smoke-free and/or introducing cessation courses (0 = no interest, 1 = interest)

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ ; Ref. = reference category (odds ratio = 1)



**Fig. 2** Interest in services, pros and cons across stages (for smoke-free policy)

(Table 5). The relationship of stage and interest in services is also illustrated in Fig. 2, which additionally shows the rise of pros and the decline of cons across stages (for smoke-free policies).

#### Discussion

In this study we found that almost all companies have a smoking policy in place, with 42.6% having at least an indoor ban. Compared to the 2001 survey (Buchmann and Müller 2001), where 16% of the Swiss companies were declared to be smoke-free, this reflects an increase of 26%. However, the gains are weaker in certain sectors of the workforce: companies from the building and hospitality sectors, companies with a high proportion of men, whose representatives are less concerned about TP, and whose management perceives less advantages of smoke-free policies tend to have weaker smoking policies. Individual support measures are much less common than smoking policies; they are mainly prevalent in larger companies with previous WHP practice. Thus, company size in our sample only plays a role for the offering of individual support measures, confirming other findings that larger companies invest more in WHP measures (McMahan et al. 2001). Small companies are, in contrast to the initial hypothesis, just as likely as large companies to have strict policies. Personal concern and perceived advantages are important predictors for both TP measures, whereas the percentage of unskilled workers, workforce stability, centralisation, and the representative's smoking status have no bearing on either.

Concerning health outcomes, our data show that regulations that either ban smoking completely (indoors and

outdoors) or restrict it to outdoor areas are most effective in terms of smoking prevalence and ETS-related problems, i.e. all other policies (e.g. restricting smoking to designated smoking areas) are associated with a significantly higher proportion of smokers in the workforce and with more ETS-related problems. In contrast to a smoke-free policy, the number of individual support measures has no impact on these outcomes, nor is absenteeism affected by any of the TP measures. Certainly, absenteeism is influenced by a variety of other factors, which probably accounts for this result. Also, absenteeism does not influence interest in WHP services, nor does percentage of smokers. Rather, ETS-related problems, and contemplation and preparation stages predict interest in services.

In summary, the proposed hypotheses were partially confirmed. However, the study is subject to some limitations: First, as our sample covers only the Canton of Zurich, it is not representative for Switzerland. Second, the representativity with regard to the Canton of Zurich might be limited due to survey nonresponse of those companies in which WHP, and particularly TP, are of low priority, and due to overrepresentation of organisations from the health and welfare sector. Since those organisations have the strictest policies, our results probably overestimate the prevalence of TP measures and the restrictiveness of tobacco policies. Third, it should be noted that the study design is cross-sectional and causal interpretations are, thus, illegitimate. For example, it is not clear from our data whether there are fewer smokers in a specific worksite because of a strict smoking policy, or whether it is easier to implement strict smoking policies when most of the employees are non-smokers. The literature regarding causal impacts is ambiguous (Albertsen et al. 2006), there are, however, studies suggesting a causal effect of smoke-free policies on smoking prevalence (e.g. Evans et al. 1999). A fourth limitation refers to the way the data were gathered. Relying on self-reports of only one representative involves the risk of certain biases. For example, respondents might have been inclined to present their worksites in a favourable light. This might partially account for the high correlations between the representatives' attitudes and TP measures. Also, the respondent's subjective perception of the company's situation might not reflect the situation as perceived by other members of the organisation. However, the attitude of the representatives is significant, as they are the relevant target group for actively disseminating worksite TP.

Notwithstanding these limitations, the study helps to better understand the predictors for the adoption of workplace TP, the outcomes of TP measures, and the motives for demanding WHP services. To further promote TP and provide protection against passive smoking for all employees, irrespective of branch and the decision-makers'

attitudes, a legal regulation is needed which covers all types of worksites. As our findings show that a complete ban provides the best results from a public health perspective, the regulation ideally should avoid exceptions from indoor bans. Until such a regulation will eventually come into effect, public health and TP actors should encourage companies to adopt TP on a voluntary basis, placing special emphasis on the above-mentioned worksites that are less advanced in terms of policy restrictiveness. Stage-specific information should be used to design tailored interventions, aiming at the decision-maker's beliefs and values, shifting the decisional balance from cons to pros in the pre-contemplation and contemplation stage, and providing concrete information and consulting for the implementation of TP measures in the preparation and action stage (Prochaska 2000). In order to evaluate the progress made with disseminating worksite TP, and to assess the effect of forthcoming legal regulations, this study serves as a starting point by providing baseline data on current prevalence of worksite TP and the distribution of stages of change.

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## References

- Albertsen K, Borg V, Oldenburg B (2006) A systematic review of the impact of work environment on smoking cessation, relapse and amount smoked. *Prev Med* 43:291–305
- Ashley MJ, Eakin J, Bull S, Pederson L (1997) Smoking control in the workplace: Is workplace size related to restriction and programs? *J Occup Environ Med* 39:866–873
- Barone-Adesi F, Vizzini L, Merletti F, Richiardi L (2006) Short-term effects of Italian smoking regulation on rates of hospital admission for acute myocardial infarction. *Eur Heart J* 27:2468–2472
- Bauer G, Jenny G (2007) Development, implementation and dissemination of occupational health management (OHM): putting salutogenesis into practice. In: McIntyre S, Houdmond J (eds) *Occupational health psychology: European perspectives on research, education and practice*, vol 2. ISMAI, Castelo da Maia, pp 219–250
- Bauer G, Schmid M, Zellweger U, Krueger H (2002) *Betriebliches Gesundheitsmanagement 2001 - Entwicklungsstand in Schweizer Dienstleistungsunternehmen* [Worksite health promotion 2001—Stage of development in Swiss service businesses]. Institut für Sozial- und Präventivmedizin der Universität Zürich/Institut für Hygiene und Arbeitsphysiologie ETH Zürich, Zürich
- Biener L, Glanz K, McLerran D, Sorensen G, Thompson B, Basen-Engquist K, Linnan L, Varnes J (1999) Impact of the working well trial on the worksite smoking and nutrition environment. *Health Educ Behav* 26:478–494

- Brownson RC, Hopkins DP, Wakefield MA (2002) Effects of smoking restrictions in the workplace. *Annu Rev Public Health* 23:333–348
- Buchmann H, Müller R (2001) Alkohol- und Tabakprävention in Schweizer Unternehmen [Alcohol and tobacco prevention in Swiss companies]. SFA/ISPA, Lausanne
- Bush R, Wooden M (1995) Smoking and absence from work: Australian evidence. *Soc Sci Med* 41:437–446
- Cooke M (2000) The dissemination of a smoking cessation program: Predictors of program awareness, adoption and maintenance. *Health Promot Int* 15:113–124
- Emmons KM, Biener L (1993) The impact of organizational characteristics on smoking policy restrictions in midwestern hospitals. *Am J Health Promot* 8:43–49
- Emmons KM, Thompson B, McLerran D, Sorensen G, Linnan L, Basen-Engquist K, Biener L (2000) The relationship between organizational characteristics and the adoption of workplace smoking policies. *Health Educ Behav* 27:483–501
- Evans WN, Farrelly MC, Montgomery E (1999) Do workplace smoking bans reduce smoking? *Am Econ Rev* 89:728–747
- Fichtenberg CM, Glantz SA (2002) Effect of smoke-free workplaces on smoking behaviour: systematic review. *Br Med J* 325:188–191
- Fielding JE (1990) Worksite health promotion survey: smoking control activities. *Prev Med* 19:402–413
- Frankish JC, Johnson JL, Ratner PA, Lovato CY (1997) Relationship of organizational characteristics of Canadian workplaces to anti-smoking initiatives. *Prev Med* 26:248–256
- Gerlach KK, Shopland DR, Hartman AM, Gibson JT, Pechacek TF (1997) Workplace smoking policies in the United States: Results from a national survey of more than 100, 000 workers. *Tob Control* 6:199–206
- Glasgow RE, Sorensen G, Corbett K (1992) Worksite smoking control activities: prevalence and related worksite characteristics from the COMMIT Study, 1990. *Prev Med* 21:688–700
- Glasgow RE, Sorensen G, Giffen C, Shipley RH, Corbett K, Lynn W (1996) Promoting worksite smoking control policies and actions: the community intervention trial for smoking cessation (COMMIT) experience. *Prev Med* 25:186–194
- Halpern MT, Shikar R, Rentz AM, Khan ZM (2001) Impact of smoking status on workplace absenteeism and productivity. *Tob Control* 10:233–238
- Hammond SK, Sorensen G, Youngstrom R, Ockene JK (1995) Occupational exposure to environmental tobacco smoke. *JAMA* 274:956–960
- Heloma A, Jaakkola M (2003) Four-year follow-up of smoke exposure, attitudes and smoking behaviour following enactment of Finland's national smoke-free work-place law. *Addiction* 98:1111–1117
- Herbst K, Kraus L, Scherer K (1996) Repräsentativerhebung zum Gebrauch psychoaktiver Substanzen bei Erwachsenen in Deutschland: Schriftliche Erhebung 1995 [Representative poll among adults in Germany on the use of psychoactive substances: Written survey in 1995]. Bundesministerium für Gesundheit/IFT, München
- Hu SC, Huang SY, Li D, Wen CP, Tsai SP (2005) Workplace smoking policies in Taiwan and their association with employees' smoking behaviours. *Eur J Public Health* 15:270–275
- Huisman M, Kunst AE, Mackenbach JP (2005) Inequalities in the prevalence of smoking in the European Union: Comparing education and income. *Prev Med* 40:756–764
- Keller R, Radtke T, Krebs H, Hornung R (2009) Der Tabakkonsum der Schweizer Wohnbevölkerung in den Jahren 2001 bis 2008. Tabakmonitoring – Schweizerische Umfrage zum Tabakkonsum [Tobacco consumption in the Swiss resident population between 2001 and 2008. Tobacco monitoring - Swiss Survey of Tobacco Consumption]. Institut der Universität Zürich, Sozial- und Gesundheitspsychologie, Zürich
- Levy DT, Chaloupka F, Gitchell J (2004) The effects of tobacco control policies on smoking rates: a tobacco control scorecard. *J Public Health Manag Pract* 10:338–353
- Linnan L, Emmons KM, Abrams DB (2002) Beauty and the beast: results of the Rhode Island smokefree shop initiative. *Am J Public Health* 92:27–28
- Marcus BH, Emmons KM, Abrams DB, Marshall RJ, Kane M, Novotny TE, Etzel RA (1992) Restrictive workplace smoking policies: Impact on nonsmokers' tobacco exposure. *J Public Health Policy* 13:42–51
- McMahan S, Wells M, Stokols D, Phillips K, Clitheroe HC (2001) Assessing health promotion programming in small businesses. *Am J Health Stud* 17:120–130
- McMahon A, Kelleher C, Helly G, Duffy E (2002) Evaluation of a workplace cardiovascular health promotion programme in the Republic of Ireland. *Health Promot Int* 17:297–308
- Menzies D, Nair A, Williamson PA, Schembri S, Al-Khairalla MZH, Barnes M, Fardon TC, McFarlane L, Magee GJ, Lipworth BJ (2006) Respiratory symptoms, pulmonary function, and markers of inflammation among bar workers before and after a legislative ban on smoking in public places. *JAMA* 296:1742–1748
- Prochaska JM (2000) A transtheoretical model for assessing organizational change: A study of family service agencies' movement to time-limited therapy. *Fam Soc J Contemp H* 81:76–84
- Radtke T, Krebs H, Keller R, Hornung R (2007) Passivrauchen in der Schweizer Bevölkerung 2006 [Second-hand smoking in the Swiss population 2006]. Psychologisches Institut, Universität Zürich, Zürich
- Repace JL, Hyde JN, Brugge D (2006) Air pollution in Boston bars before and after a smoking ban. *BMC Public Health* 6: np
- Rogers EM (2003) Diffusion of innovations, 5th edn. Free Press, New York
- Sorensen G, Rigotti N, Rosen A, Pinney J, Prible R (1991) Effects of a worksite nonsmoking policy: evidence for increased cessation. *Am J Public Health* 81:202–204
- Sorensen G, Glasgow RE, Topor M, Corbett K (1997) Worksite characteristics and changes in worksite tobacco-control initiatives: results from the COMMIT study. *J Occup Environ Med* 39:520–526
- U.S. Department of Health and Human Services (1993) 1992 National survey of worksite health promotion activities: summary. *Am J Health Promot* 7:452–464
- U.S. Department of Health and Human Services (2006) The health consequences of involuntary exposure to tobacco smoke: a report of the surgeon general. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, Coordinating Center for Health Promotion, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, Atlanta, GA